In order to perform total signal, noise and interference power measurements, a common measurement bandwidth must be chosen. Recall that an important goal of the test configuration of Figure A-2 was to allow for independent control of the received carrier power, *C*, the total noise power, *N*, and the interference power, *I*. Special consideration was given to measurement of the total carrier power, *C*.

Because the carrier power was a measurement of a live satellite signal, it is not possible to measure without consideration of the atmospheric noise. To overcome the inaccuracy introduced by the noise, a receive dish much larger than typically used by the consumer (90 cm) was used to collect the signal. Use of this large dish resulted in received carrier-to-noise ratios much greater than 10dB. Because of this, the intermediate frequency (IF) power measured at the output across the bandwidth of a single transponder could be attributed entirely to the radiated space vehicle (SV) power. To further substantiate, the 90cm dish was pointed at "clear sky". Although the resulting measure of sky noise power was still above the noise floor of the spectrum analyzer, its power level did not modify the least significant digit of the former carrier power measurement when subtracted. That is to say that the total carrier power plus noise measured when the large dish was appropriately pointed at the DBS satellite, minus the sky noise power measured when pointed at "clear sky" was for all practical purposes, equal to the total power measured in the first measurement.

Although a bandwidth of 24 MHz would account for the entire power contained in the DBS signal, the signal to noise ratio of the received satellite signal degrades in the roll off region of the transponder. Thus it was more accurate to make the signal power measurements in as small a bandwidth as was reasonable. As an alternative to 24 MHz, power and noise measurements can be made over the effective bandwidth of the DBS signal.

The effective bandwidth of the DBS signal is found by computing the bandwidth of a uniformly rectangular spectrally shaped signal with spectral density equal to that of the center of the DBS signal, which would contain the same total power as the DBS signal. See figure A-3. Measurements of the effective signal bandwidth were measured to be 20 MHz. This can be visualized by observing that the 50% and 75% power occupied bandwidths (over which the spectral density is flat) are 10 MHz and 15 MHz, respectively. Note however that when using a 20 MHz bandwidth to measure the DBS signal power, a 0.2 dB underreporting occurs. This is because only 95% of the DBS signal power ($10*\log(0.95) = -0.2$ dB) is contained in that bandwidth. A correction factor of +0.2 dB was added to all DBS signal power measurements to account for the missing power in the tails.

Signal power measurements are obtained using the Measure/User softkey available on the spectrum analyzer.

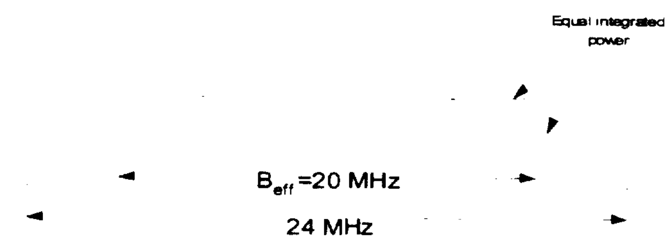

Figure A-3. Notional Depiction of DBS Effective Bandwidth

A.3.1.2 Noise Power Measurements

Noise power measurements are performed using the Measure/User softkey available on the analyzer. A measurement bandwidth of 20 MHz is specified as a parameter to the analyzer using the appropriate entry keys. While performing noise measurements, the DBS video signal is disconnected. The analyzer computes integrated noise power over the specified bandwidth.

A.4 Notes on Interference Testing

This section contains notes applicable to the equipment and methods of the testing that is articulated in the subsequent sections.

A.4.1 Test Objectives

The goal of the receiver testing was to characterize how the DBS systems performed in the presence of MVDDS interference at various levels of $C/(N+I)$ and N/I. Throughout the testing, N/I was varied to achieve the following levels: +infinity (noise only), +10dB, +3dB, 0 dB, -3dB, -10dB, and –infinity (MVDDS interference only). Once N/I was established, the aggregate combination of $N+I$ was raised in power to degrade the signal quality to a pre-determined level.

A.4.2 DBS Equipment

In order to maintain the independence of the tests, DBS set-top boxes were procured that were not traceable back to MITRE. This was done thanks to a close family member of one of the members of the testing staff, (with a different surname), independently procuring DBS set-top boxes for both Dish TV and DIRECTV at retail locations that were not in the immediate vicinity of the Bedford facility.

The set top equipment procured was Philips Magnavox Dish model DSK2812S and RCA DIRECTV plus! model DRD420RE. These set-top boxes are shown in Figure A-4.

Figure A-4. Set-Top Boxes Used in Receiver Testing

Although a great deal of set-top equipment was made available by the DBS manufacturers, it was not deemed acceptable for use in an independent test, and the constraints of time and budget did not permit any detailed testing of that equipment.

A.4.3 MVDDS Equipment

The only MVDDS equipment received for testing was a single channel transmitter made by L3 Communications. The unit consists of an AAA NTSC to MPEG converter, a BBB quadrature phase shift keying (QPSK) modulator, and a CCC amplifier. The unit is shown in Figure A-5.

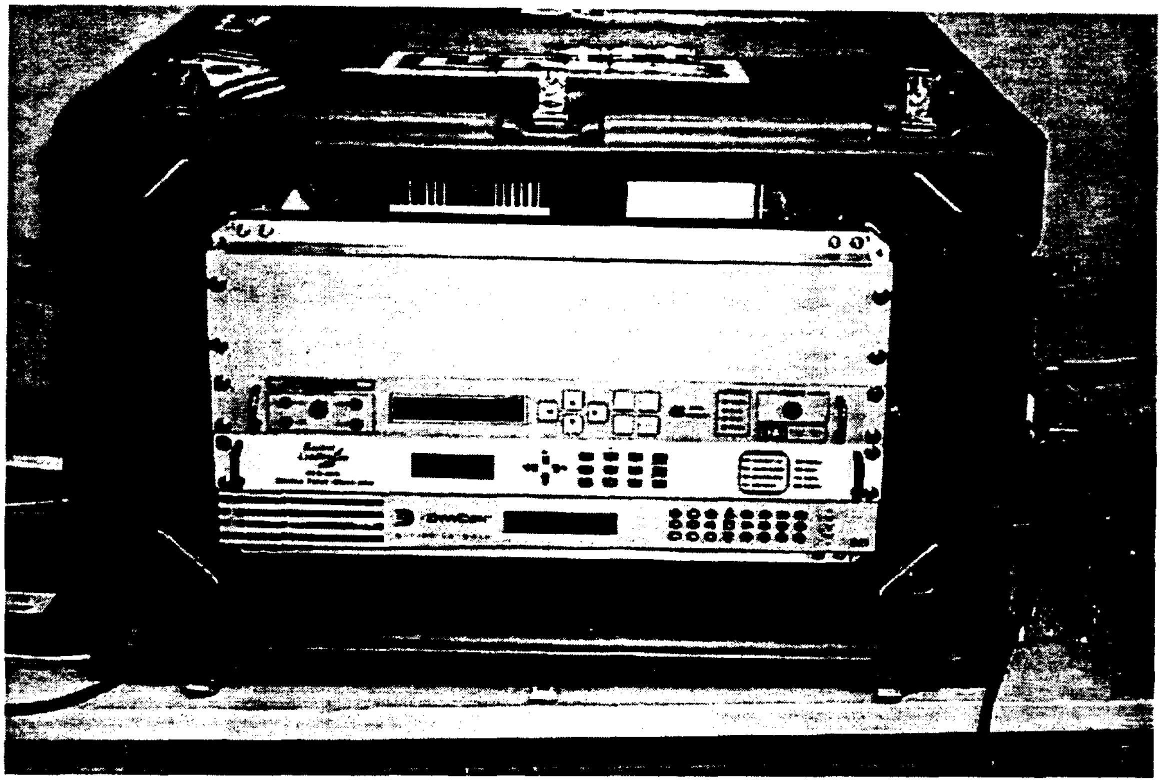

Figure A-5. Northpoint MVDDS Single Channel Transmitter

A.4.4 Signal Quality Level 6

Initial experimentation injecting representative MVDDS interference signals into closed DBS links revealed it was simple and reliable to control the relative rate of occurrences of disturbances to the DBS signal using the test configurations identified in Appendix A. However reliably measuring a small number of disturbances that occurred over the course of an hour (or even hours for that matter) is extremely time consuming and potentially fraught with inaccuracy due to too small a sample space, and the likelihood of changing atmospheric conditions over long periods of time.

An A/V quality level of 6, (see Table A-1), an audio or visual degradation occurring on the average of 1 to 4 times per minute was chosen as the measurement standard. This A/V quality level was chosen primarily for its repeatability and the reduction of time in test execution that it offered. Additionally, an A/V quality level of 6 occurs roughly mid-range in the narrow span over which signal degradation can actually be observed, between no degradation and total loss of signal lock.

Selection of video quality 6 is not intended to be an advocation of that level as either acceptable or unacceptable to the consumer. Rather it is a convenient point to identify in a short range between perfect quality and loss of lock in the vicinity of the mean of that range.

A.4.4.1 Dynamic Allocation of DBS Transponder Bandwidth to Stations

Another factor important to mention is that the bandwidth for any given channel is dynamically allocated from a transponder that carries the burden of several channels. This adjustment is made automatically based upon the need for bandwidth post compression. Typically, television scenes with more action result in lower compression ratios and require more bandwidth for quality transmission.

Typically, a fixed $C/(N+I)$ would result in a fixed bit error rate, but the number of errors per second would be the largest on those channels consuming the most instantaneous bandwidth on that transponder. Thus every attempt was made to measure video quality during programming sequences that had high levels of action.

The impact to the laboratory measurements of this artifact of the DBS systems is that a fixed A/V quality may trace back to bit error performances between transponders. Additionally, since the uncorrected bit errors will be distributed ratiometrically according to the channel utilization relative to the total transponder bandwidth, the measured $C/(N+I)$ required to drive one particular channel to A/V quality 6 may be different than another channel. However, since the range of perceptible A/V degradation (between A/V quality 9 and loss of lock) is relatively narrow, then comparative results between channels on different transponders should compare reasonably.

A.4.5 Elimination of Drive Power as Testing Variable

In order to reduce the dimensionality of the testing, it was necessary to determine whether the drive power of the signal to the DBS set-top box had an impact on the $C/(N+I)$ that would degrade the signal quality. The DBS set-top boxes are specified for a drive input between –25 dBm to –65 dBm. A visual test was performed. With the drive power attenuated to near the –65 dBm minimum, the $C/(N+I)$ was adjusted so that the video quality was within 1 dB of noticeable degradation. Drive power was successively increased in 5 dB steps. After each step, 1 additional dB of interference was added, and a visually equivalent degradation to the quality of the video signal at the previous step was observed. The 1 dB of additional interference was then removed prior to the next step. This test was performed at several N/I ratios.

Figures A-6 and A-7 are presented (beyond the anecdotal results discussed above) to show the impact of changing the drive power. In Figure A-6 the resulting signal quality for varying $C/(N+I)$ are shown for 2 different drive powers, -45 dBm and –55 dBm (DIRECTV). In Figure A-7 the conditions are –30 dBm and –55 dBm are used for DISH Network (i.e., EchoStar). Note the consistency between the *C*/(*N*+*I*) values required to drive the signal quality to level 6, for both systems.

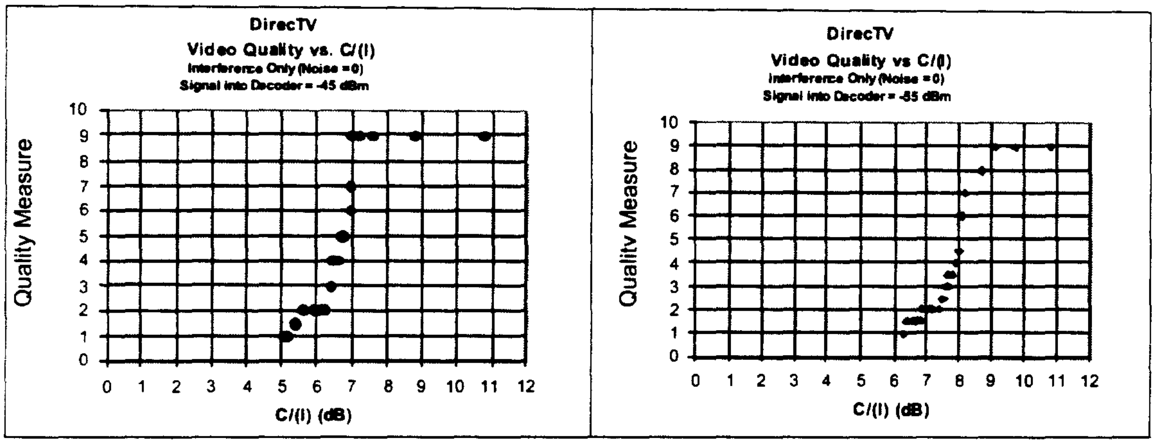

Figure A-6. Comparison of 2 Different Drive Powers for DIRECTV

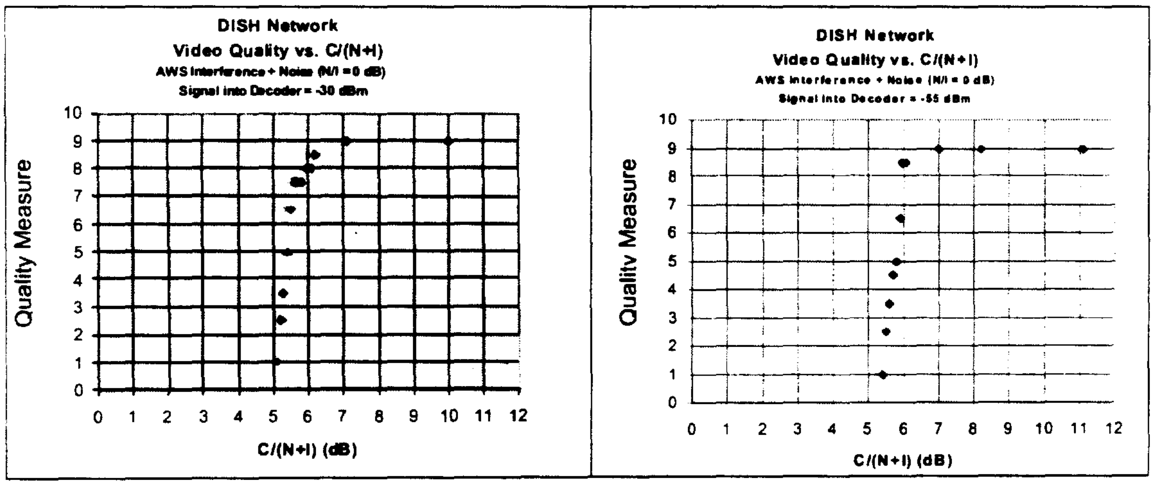

Figure A-7. Comparison of 2 Different Drive Powers for Dish TV

A.4.6 Selection of Programming

As discussed above, programming with action sequences was chosen due to the likelihood of consumption of larger instantaneous portions of the transponder bandwidth.

Because of the flexibility of the equipment, any television channel could be targeted. Prior to execution of tests, available channels were scanned for the most promising television program. Upon selection of programming, the corresponding transponder was identified. The selected television program was used for the duration of any test.

A.4.7 Determination of Transponder Transmitting a Particular Television Channel

As discussed above, every effort was made to choose programming that contained frequent action scenes, and ostensibly consumed an above average share of the transponder bandwidth. Upon determination of appropriate programming, we determined the corresponding transponder from which the programming was being broadcast by moving a high powered tone to the (I.F.) center frequency of each of the transponders. As the power of the tone was sufficient to jam any single transponder at a time, determination of the appropriate transponder was a matter of visual inspection.

A.5 DBS A/V Quality 6 in the Presence of Northpoint MVDDS Interference Using 70 MHz IF Output Translated to L Band with Simulated Adjacent Channels

Some MVDDS interference experiments were conducted upon arrival of the MVDDS transmitter suite, but prior to an appropriate LNB downconverter being available. To proceed without the LNB, it was necessary to make use of the 70 MHz IF output of the MVDDS transmitter.

A.5.1 Test Configuration

The configuration that properly mixed the IF output of the Northpoint MVDDS transmitter and combined the mixed output with the arbitrary waveform synthesizer (AWS) to provide the adjacent MVDDS channels is shown in Figure A-8.

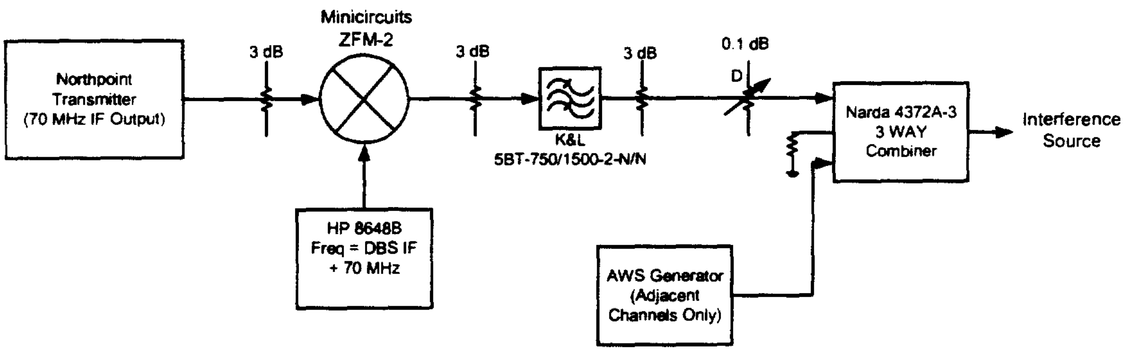

Figure A-8. Configuration for Northpoint Transmitter IF Output with Adjacent Channels

The 70 MHz output is attenuated using a 3 dB pad, upconverted using a Mini-circuits ZFM-2 mixer terminated by a 3 dB pad, and filtered with a K&L tunable bandpass filter. The signal at the output of the filter is combined (for cases with adjacent channel testing) with an arbitrary waveform synthesizer programmed to simulate MVDDS adjacent channels.

The signals are combined with a Narda 4372A-3 combiner, with the third port terminated in 50 ohms. The combined signal labeled as "interference source" is applied to the interference source input of Figure A-2. Relative power levels between the MVDDS signal and the AWS adjacent channels are adjusted using the Northpoint MVDDS Tx control keypad, the PC control interface to the AWS, and the fine adjustment attenuator D. The interference signal resulting from the combination of the Northpoint MVDDS IF output and the AWS is shown in Figure A-9.

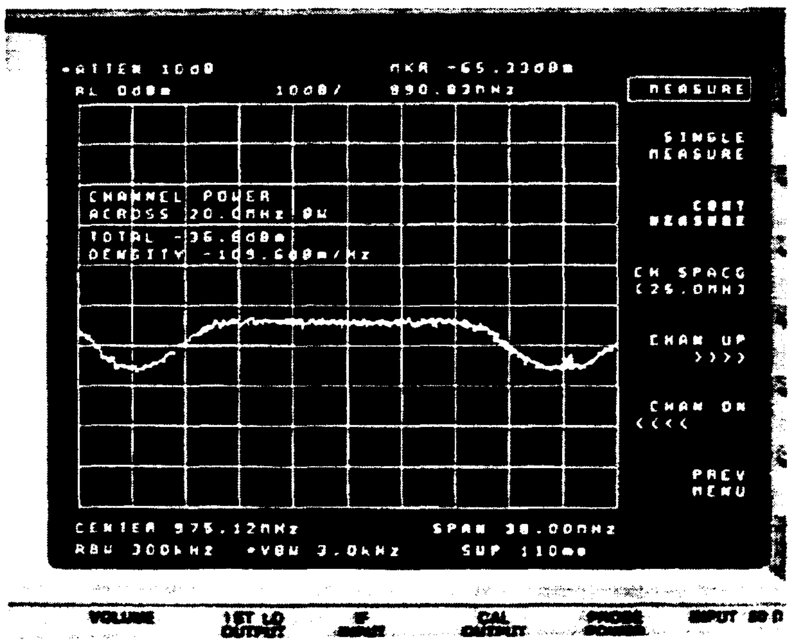

Figure A-9. Single Channel MVDDS IF Interference Plus Adjacent Channels Generated from Arbitrary Waveform Synthesizers

A.5.2 Test Results

Results for DIRECTV and Dish TV are shown in Figure A-10 and Figure A-11 respectively. Note that values for Figures A-10 and A-11 were determined at *N/I* ratios of –infinity (MVDDS interference only), -10 dB, -3dB, 0 dB, 3dB, 10 dB, and +infinity (noise only). Both DIRECTV and Dish TV are more resilient to the constant envelope, Northpoint MVDDS signal, than to the Gaussian noise. Results for +infinity and –infinity are plotted on the +30 and –30dB points, respectively.

Note the proximity of the SAT9520 measurement to the spectrum analyzer measurement in the noise-only case. Insufficient information is available about the SAT9520 to provide an accurate scaling factor that would account for the small differences in measurement bandwidth between the spectrum analyzer and the SAT9520.

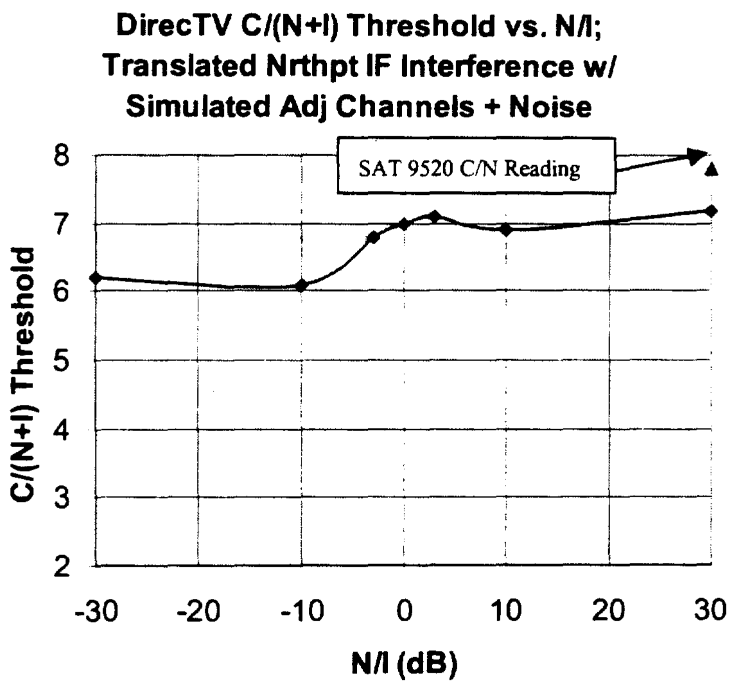

Figure A-10. Carrier-to-Noise-Plus-Interference Required to Degrade DIRECTV to A/V Quality 6 Vs. Noise-to-Interference Power Ratio; 70 MHz IF

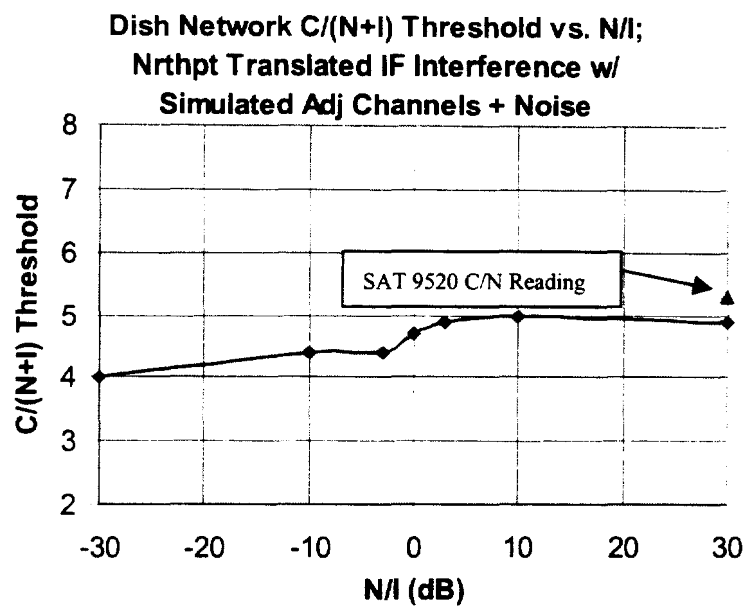

Figure A-11. Carrier-to-Noise-Plus-Interference Required to Degrade Dish TV to A/V Quality 6 Vs. Noise-to-Interference Power Ratio; 70 MHz IF

A.6 DBS A/V Quality 6 in the Presence of Northpoint MVDDS Interference Using RF Output with Simulated Adjacent Channels

The test results in Section A.5 were repeated using the 12 GHz RF output of the Northpoint MVDDS transmitter coupled into an LNB.

A.6.1 Test Configuration

The configuration for interference testing using a Northpoint MVDDS Transmitter and LNB downconverter is shown in Figures A-2 and A-12. The signal made available to the "Interference Source" in Figure A-2 is generated in Figure A-12.

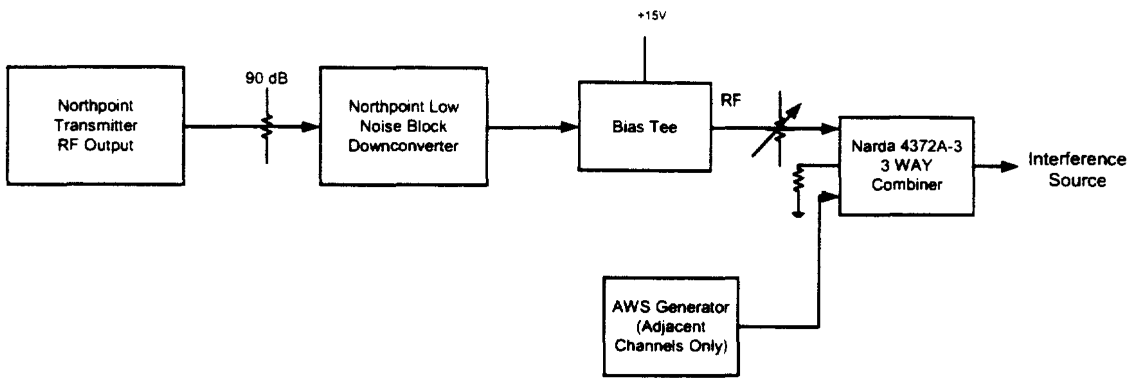

Figure A-12. Interference Test Configuration Using Northpoint Transmitter with LNB

The 12 GHz output of the Northpoint MVDDS transmitter is attenuated using a 90 dB attenuator. This signal is applied to an LNB downconverter. 15 volts is applied to the LNB using a bias tee. The RF signal is applied to the input of a Narda 4372A-3 combiner. An HP AWS programmed to generate left and right adjacent channels, is applied to the combiner. The third port of the combiner is terminated in 50 ohms. The adjacent channel power level is controlled by the PC interface to the AWS generator. This level is adjusted to equalize the adjacent channel to the Northpoint interference level.

Attenuators A and B are adjusted to fine-tune the relative levels of the noise and interference power. Attenuator C is used to control the composite noise and interference level relative to that of the DBS signal. The composite output of the Northpoint MVDDS transmitter and AWS at L-Band IF is shown in Figure A-13.

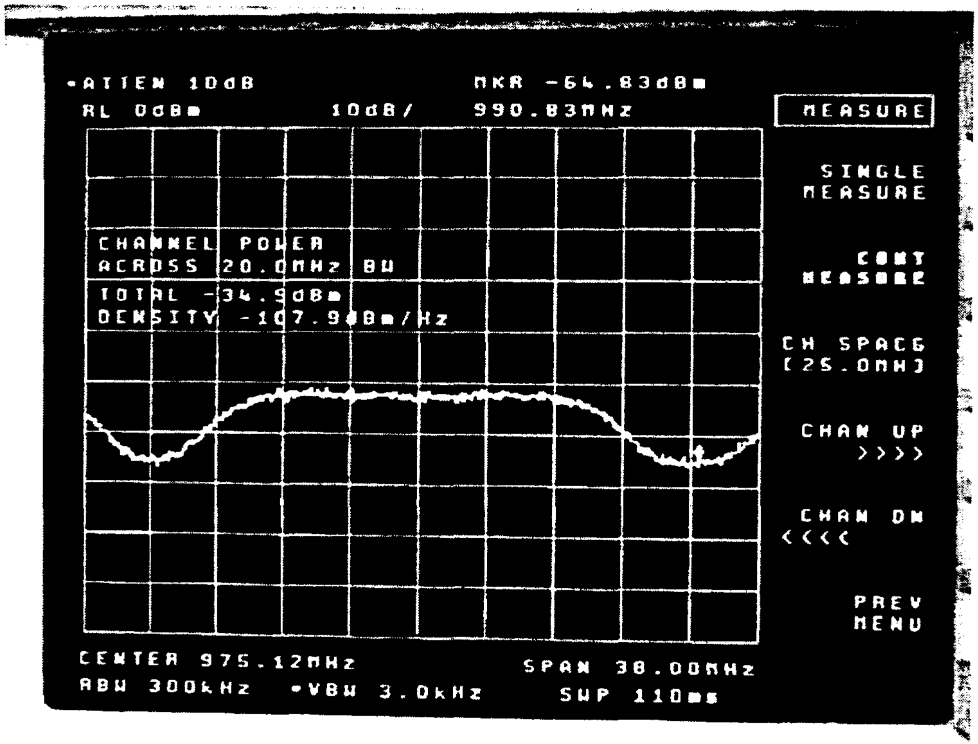

Figure A-13. Single Channel MVDDS Downcoverted RF Interference Plus Adjacent Channels Generated from Arbitrary Waveform Synthesizers

A.6.2 Test Results

Data is recorded at various noise to interference power levels, namely, +infinity, (noise only), +10 dB, +3 dB, 0 dB, -3 dB, –10 dB, and –infinity (interference only). As in the previous section, results for +infinity and –infinity are plotted on the +30 and –30dB points, respectively.

The results are shown for Direct TV and Dish TV in Figure A-14 and Figure A-15, respectively.

The same trend is observed relative to the resilience to the constant envelope QPSK MVDDS signal as compared to Gaussian noise as was observed in the previous section.

Note as well the Proximity of the SAT9520 Measurement in the noise-only case to spectrum analyzer measurements. Insufficient information is available about the SAT9520 to provide an accurate scaling factor that would account for differences in measurement bandwidth between the spectrum analyzer and the SAT9520.

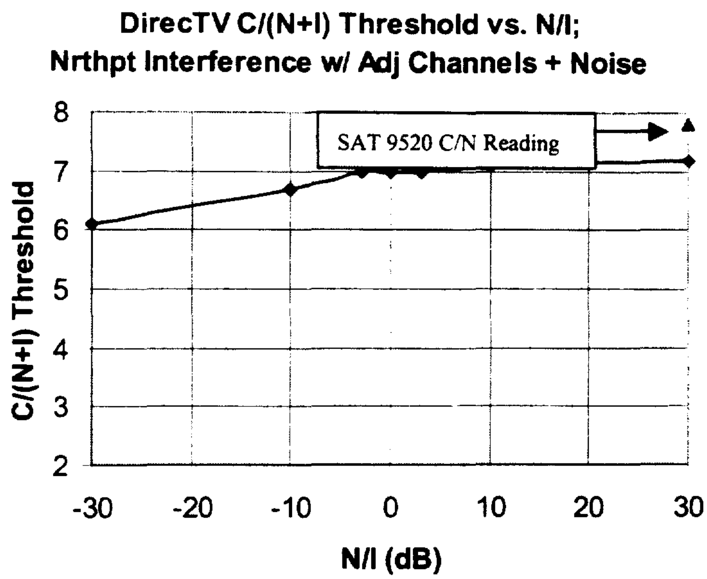

Figure A-14. Carrier-to-Noise-Plus-Interference Required to Degrade DIRECTV to A/V Quality 6 Vs. Noise-to-Interference Power Ratio; 12 GHz RF Output

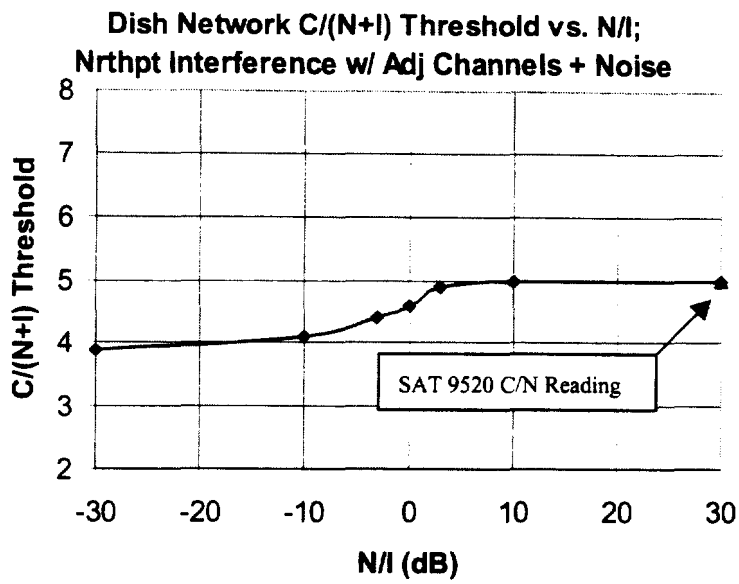

Figure A-15. Carrier-to-Noise-Plus-Interference Required to Degrade Dish TV to A/V Quality 6 Vs. Noise-to-Interference Power Ratio; 12 GHz RF Output

A.7 DBS A/V Quality 6 in the Presence of Northpoint MVDDS Interference Using RF Output with +7 MHz Offset and Simulated Adjacent Channels

Northpoint had identified a 7 MHz frequency offset between the center frequencies of the MVDDS channelization and DBS channelization as one potential means of isolation from the DBS system at their disposal. This section details the laboratory work to substantiate that claim.

A.7.1 Test Configuration

The configuration for interference testing using a Northpoint transmitter with +7 MHz offset and LNB downconverter with adjacent channels is shown in Figure A-16.

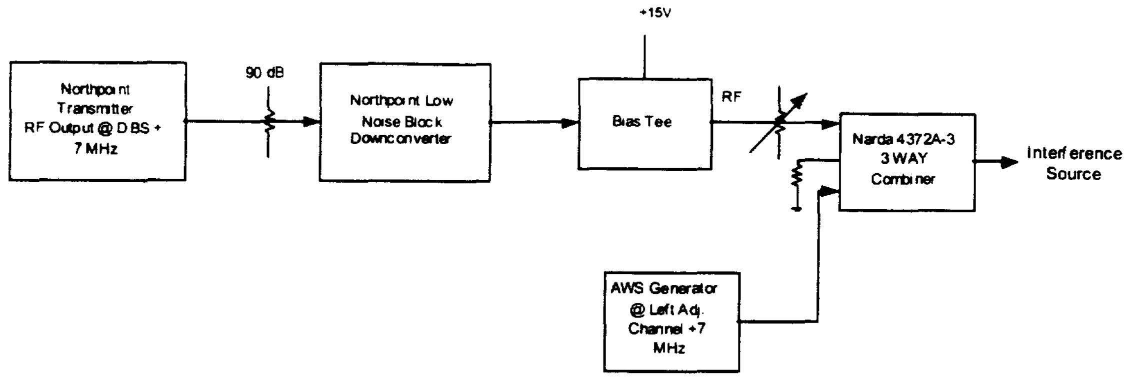

Figure A-16. Interference Test Configuration Using Northpoint Transmitter with +7 MHz Offset and LNB Downconverter

The RF output of the Northpoint MVDDS transmitter centered at the DBS frequency with a + 7 MHz offset is attenuated using a 90 dB attenuator. The 7MHz offset was achieved through programmability in the Northpoint MVDDS transmitter and verified with the Agilent spectrum analyzer. This signal is applied to an LNB downconverter. 15 volts is applied to the LNB using a bias tee. The resulting L-band IF signal is applied to the input of a Narda 4372A-3 combiner. An HP AWS programmed to generate the left adjacent channel + 7 MHz (at L band IF frequency), is applied to the combiner. The third port of the combiner is terminated in 50 ohms. The adjacent channel power level is controlled by the PC interface to the AWS generator. This level is adjusted to equalize the adjacent channel level to that of the Northpoint MVDDS interference level.

Attenuators A and B are adjusted to fine-tune the relative levels of the noise and interference power. Attenuators C and D (of Figure 2) are used to control the composite noise and interference level relative to that of the DBS signal.

A view of the total (actual plus simulated) MVDDS output translated into the L-band IF of the DBS system is shown in Figure A-17.

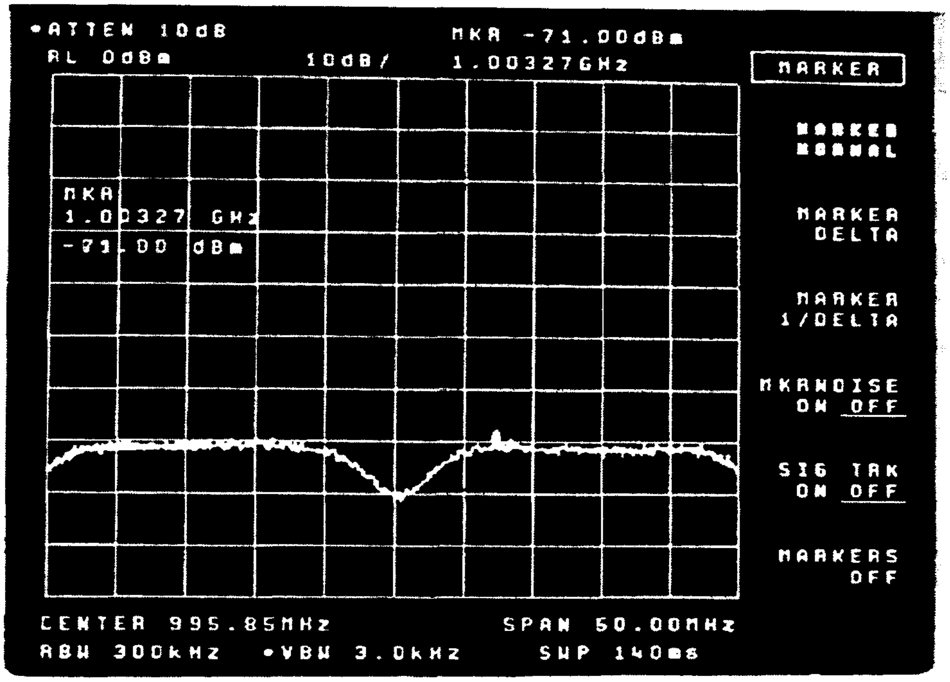

Figure A-17. Single Channel MVDDS (with 7 MHz Offset With Respect to DBS Channelization) Downcoverted RF Interference Plus One Adjacent Channel Generated from Arbitrary Waveform Synthesizer

A.7.2 Test Results

Data is recorded at various noise and interference levels, namely with noise only, interference only, and noise to interference ratios of +10 dB, +3 dB, 0 dB, -3 dB, and −10 dB. As in the previous section, results for +infinity and –infinity are plotted on the +30 and -30dB points, respectively.

The results for DIRECTV are compiled in Figure A-17. The same trend is observed relative to the resilience to the constant envelope QPSK MVDDS signal as compared to Gaussian noise.

Note as well the proximity of the SAT9520 measurement in the noise-only case to spectrum analyzer measurements. Insufficient information is available about the SAT9520 to provide an accurate scaling factor that would account for differences in measurement bandwidth between the spectrum analyzer and the SAT9520.

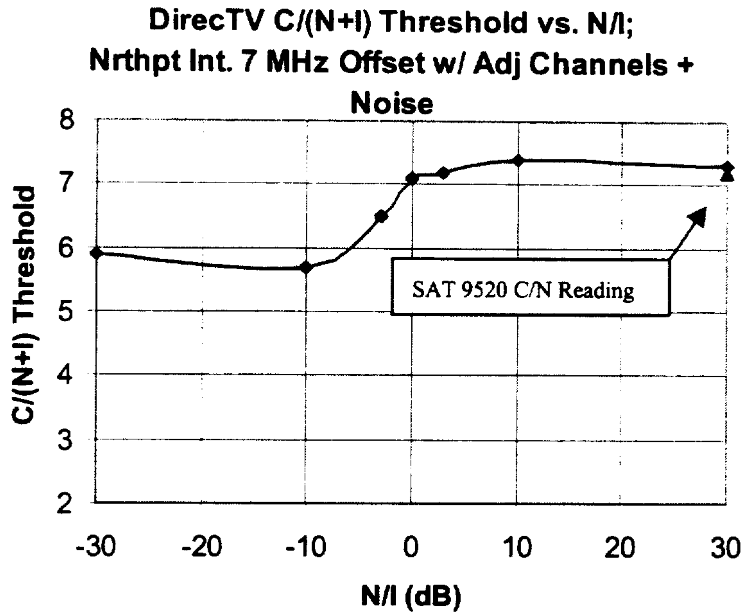

Figure A-18. Carrier-to-Noise-Plus-Interference Required to Degrade DIRECTV to A/V Quality 6 Vs. Noise-to-Interference Power Ratio; Northpoint MVDDS 12 GHz RF Output, + 7 MHz Offset from DBS Channelization

An additional test was performed with regard to the 7 MHz offset. Power over the 20 MHz bandwidth was computed for the Northpoint MVDDS transmitter plus adjacent channel, when the center frequencies of the DBS signals were aligned, and when the signals were offset by 7MHz. We noted that a power difference of 1.2 dB between the 2 signals, (the perfectly aligned signal had the greater power.) This 1.2 dB of additional isolation, that is not obvious from Figure A-18 was factored into total MVDDS power that would be required to degrade the DBS signal unavailability to a specified level.

A.8 DBS A/V Quality 6 in the Presence of Northpoint MVDDS Interference Using Open Air RF Transmission

This section describes the results of testing when a transmitted Northpoint MVDDS signal was used as interference source.

A.8.1 Test Configuration

Transmitted Northpoint MVDDS signals were coupled into a DBS receive dish mounted on a movable pedestal. The pedestal is capable of motion in both azimuth and elevation, and was oriented as to maximally couple energy from the Northpoint MVDDS transmit antenna into the L-band IF of the receive Dish. This maximal coupling occurred when the there was a direct-ray path between the transmit antenna and the Dish LNB. This coupling appeared to be relatively insensitive to small changes in elevation, as long as the direct ray path remained.

The configuration for the test is shown in Figure A-19.

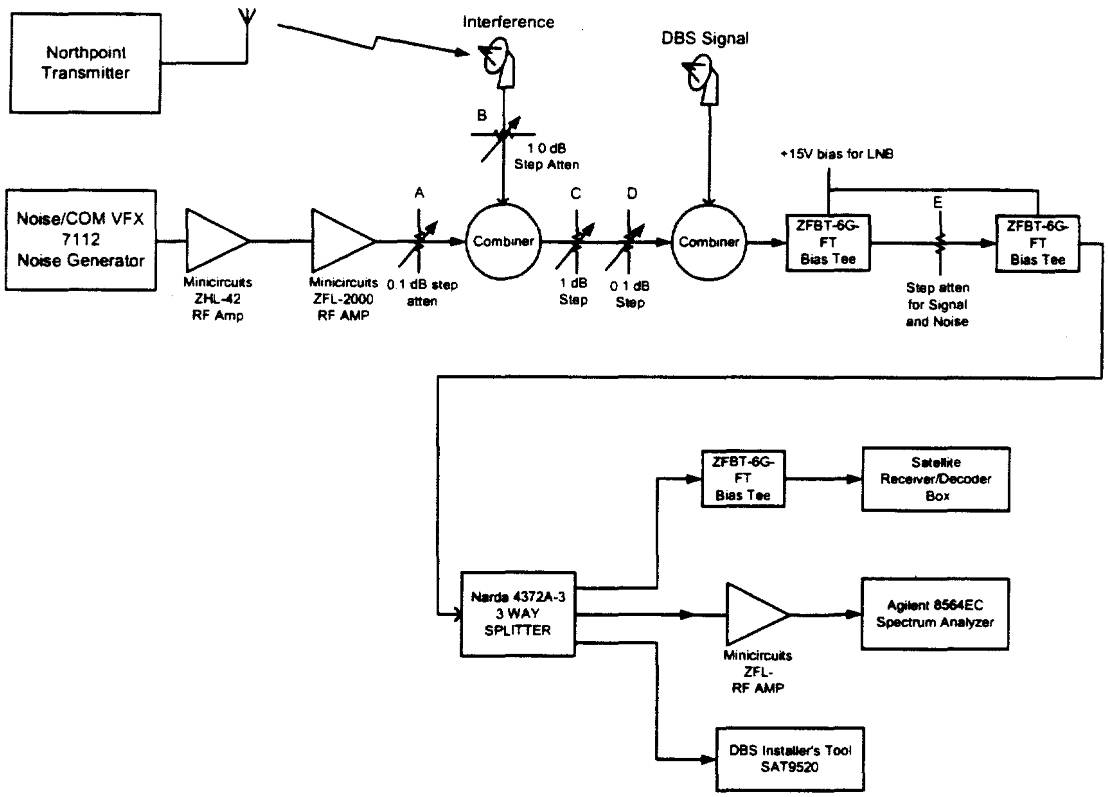

Figure A-19. Configuration for Open Range Testing of Northpoint MVDDS Interference to DBS Systems

The Northpoint transmitter/antenna broadcasts a signal which is received by a DBS dish antenna, and is converted to L band IF by the LNB contained within the dish. The L band interference signal is combined with a noise signal using an Anzac H-8-4 combiner. Noise is generated using a Noise/COM VFX 7112 generator and amplifier chain. The noise/interference signal is combined with the DBS "desired" signal using a second H-8-4 combiner. Attenuators A and B along with the variable about level capability of the Noise/COM generator serve to control the relative levels of N and I. Attenuators C and D vary the $N+I$ total, relative to the carrier level C. Bias tees provide DC power for the LNBs of the two dishes. A Narda 3 way splitter provides outputs for the Satellite Set-top box, Agilent spectrum analyzer, and DBS SAT 9520 Installer's Tool. Note that the pedestal mounted DBS receive antenna was pointed at clear sky, and the 90 cm dish was used to collect DIRECTV signals.

A view of the received power spectrum of the transmitted Northpoint MVDDS coupled into the spillover lobe of the receive dish is shown in Figure A-20.

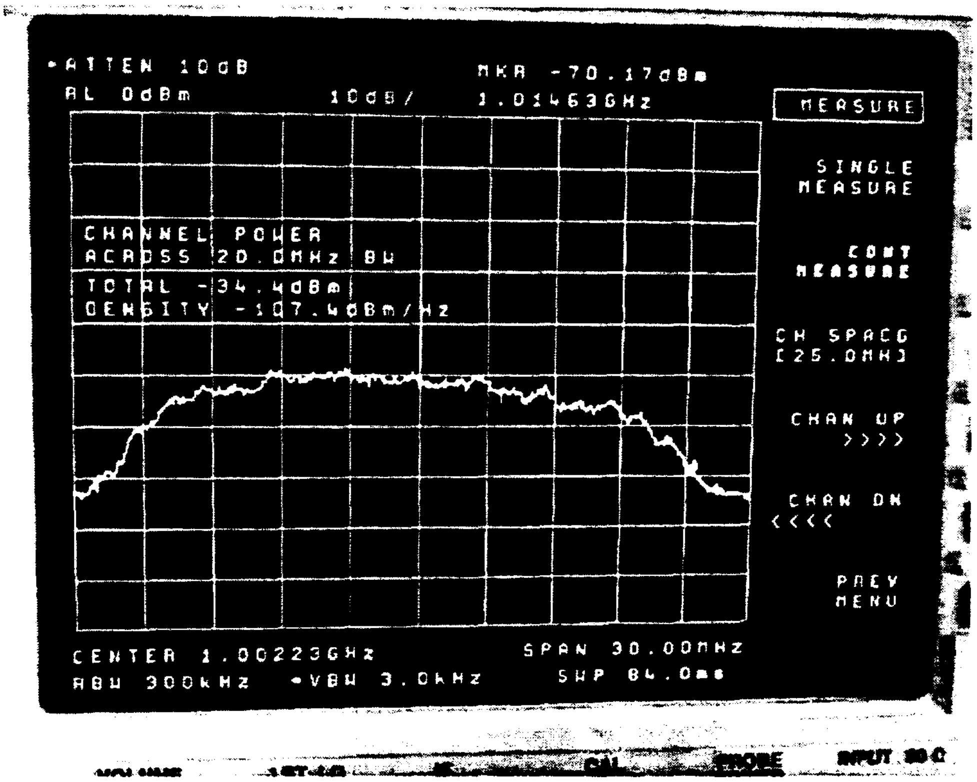

Figure A-20. Single Channel MVDDS Open Range Transmission Coupled into Spillover Region of a DBS Receive Dish

A.8.2 Test Results

Data is recorded at various noise to interference power levels, namely, +infinity, (noise only), +10 dB, +3 dB, 0 dB, -3 dB, –10 dB, and –infinity (interference only). As in the previous section, results for +infinity and –infinity are plotted on the +30 and –30dB points, respectively.

Due to lack of time, results were compiled for DIRECTV only and are shown in Figure A-21.

The same trend is observed relative to the resilience to the constant envelope QPSK MVDDS signal as compared to Gaussian noise as was observed in the previous section. That is that there is approximately 1 dB resilience to the constant envelope QPSK interference versus Gaussian interference.

The performance curve given in Figure A-21 sits nearly 1 dB higher in *C/(N+I)* than the curve of Figure A-14, the lab 12 GHz measures, and the translated IF measurements of Figure A-10. This 1 dB difference is easily accounted for through the combination of measurement error and DBS transponder bandwidth channelization differences.

Note as well the Proximity of the SAT9520 Measurement in the noise-only case to spectrum analyzer measurements. Insufficient information is available about the SAT9520 to provide an accurate scaling factor that would account for differences in measurement bandwidth between the spectrum analyzer and the SAT9520.

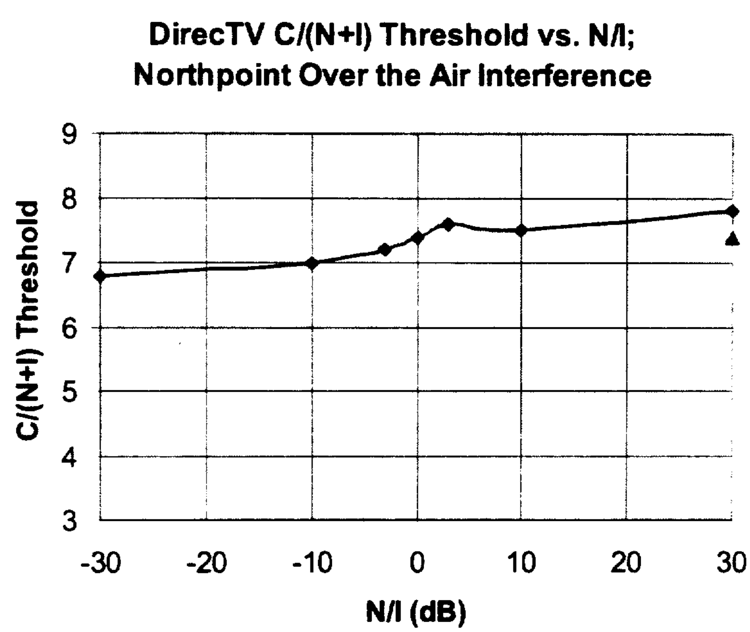

Figure A-21. Carrier-to-Noise-Plus-Interference Required to Degrade DIRECTV to A/V Quality 6 Vs. Noise-to-Interference Power Ratio; Northpoint MVDDS 12 GHz RF Output, Open Range

A.8.3 Notes on Open Air Testing

This subsection contains anecdotal notes on some ad-hoc tests that were performed during the process of antenna installation and measurement.

A.8.3.1 MVDDS Antenna Azimuth and Elevation

During installation of the MVDDS transmit antenna on the roof of the MITRE facility in preparation for open range testing, one ad-hoc test was performed for the purpose of assessing the impact of MVDDS antenna azimuth and elevation on existing DBS installations.

With the MVDDS antenna pointed due North and 0 degrees elevation, the transmit power of the antenna was raised to the point of interfering with the DBS installation used for the laboratory interference measurements discussed in the previous sections, (approximately 300 feet away). Turning the antenna due east, at 5 degrees elevation, the transmit power was raised by 13 dB prior to any degradation of the previous installation.

While not intended to be a quantitative test, it is interesting to note that Northpoint engineers were able to predict and mitigate the impact of the MVDDS transmission on a nearby installation.

A.8.3.2 Shielding of DBS Antenna as a Means of Interference Mitigation

As alluded to above, the range was configured to maximally couple the MVDDS transmit energy into any portion of the DBS antenna excluding the main beam. As suspected from the antenna gain pattern measurements, maximum coupling occurred when a direct ray from the MVDDS transmission could be drawn to the LNB of the DBS antenna.

This direct path was blocked by holding a lightweight piece of scrap aluminum between the MVDDS transmitter and the dish. We were subsequently able to couple the unattenuated input from the DBS dish (bypassing attenuator B of Figure A-19) without degrading the AV quality of the channel under test. Note that the total power across a 20 MHz bandwidth for the unattenuated signal at the output of the LNB was –34 dBm, on the same order of magnitude as the DBS signal.

A.9 Summary of Results

The lab measurements show that the constant amplitude of the MVDDS interference signal gives it a slight compatibility advantage with the DBS signal as opposed to Gaussian noise of the same power. This advantage is on the order of 1 dB when the total interference is dominated by MVDDS interference. Results vary slightly between Dish TV and DIRECTV when the interference and noise are close to the same power. Any practical advantage was very difficult to identify when the interference signal power was 3 dB or more below the noise power for either of the two DBS systems.

Several mitigation techniques were tested:

- When a 7 MHz offset is used by the MVDDS transmission with respect to the DBS channelization, and additional isolation of approximately 1.2 dB from the DBS signal can be achieved due to the spectral mismatch between the victim signal and interferer.

- Appropriate selection of antenna azimuth and elevation angles was demonstrated to be effective in mitigating interference in areas close by. This is perhaps done at the expense of the MVDDS cell size.
- Blocking of the direct path between an MVDDS transmitter and a DBS dish LNB proved very effective in mitigating interference.

4

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FCC REPORT: TERRESTRIAL SYSTEMS, DBS INCUMBENTS COULD SHARE Ku-BAND SPECTRUM

Operation of terrestrial wireless systems in the Ku-band would pose "a significant interference threat" to incumbent direct broadcast satellite (DBS) operators. But mitigation techniques could allow the two systems to co-exist, according to tests commissioned by the FCC. The mitigation techniques include imposing operational parameters on terrestrial systems, changing their design, and relocating or modifying DBS receivers, according to MITRE Corp., the company that conducted the tests.

Congress mandated the tests to help resolve a dispute over Northpoint Technology Ltd.'s proposal to share the 12.2-12.7 gigahertz band with DBS operators. Northpoint says its tests show that its terrestrial wireless service won't interfere with DBS operations, but DBS companies say their tests suggest otherwise (TR, Oct. 16 and 30, 2000; and Feb. 26).

The FCC concluded last November that Northpoint's system could operate in the Ku-band without interfering with DBS systems (TR, Dec. 4, 2000). In a further rulemaking notice, it sought comments on technical and service rules for licensing Northpoint and others to offer a new multichannel video distribution and data service (MVDDS) (TR, March 19).

The FCC is seeking comments on the test results, which were released late April 23. Comments are due May 15 and replies May 23 in Engineering and Technology docket 98-206.

Both Northpoint and DBS providers today said the MITRE test results supported their side. Northpoint President Sophia Collier said her system already employed the mitigation techniques that would be required for a terrestrial system to operate without harming DBS operators.

"MITRE correctly concluded that satellite-terrestrial sharing requires specialized technology like [Northpoint's] in order to be effective -- and that without such a system such as Northpoint's, sharing cannot work," she said. "From our point of view, we passed the MITRE test."

But the Satellite Broadcasting and Communications Association (SBCA), DIRECTV, Inc., and EchoStar Communications Corp. offered a different view of the test results. SBCA President Charles Hewitt questioned whether the mitigation suggested by MITRE was feasible. "The consumer mitigation techniques suggested in the MITRE report are egregious and far too burdensome for any consumer who is happily enjoying DBS services," he said.

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The New York Times

"More studies are not the answer because the physics are well known," said Dale N. Hatfield, director of the interdisciplinary telecommunications program at the University of Colorado at Boulder who recently stepped down as the head of the F.C.C.'s office of engineering and technology.

"I personally felt that this technology should be introduced because the spectrum is becoming increasingly scarce and this looks like a good plan to make better use of it. This fight shows the politicization of spectrum management, which I find quite scary."

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